SERVICE MANUAL & PARTS LIST

(without price)

ELECTRONIC KEYBOARD

EP-10

APR. 1987

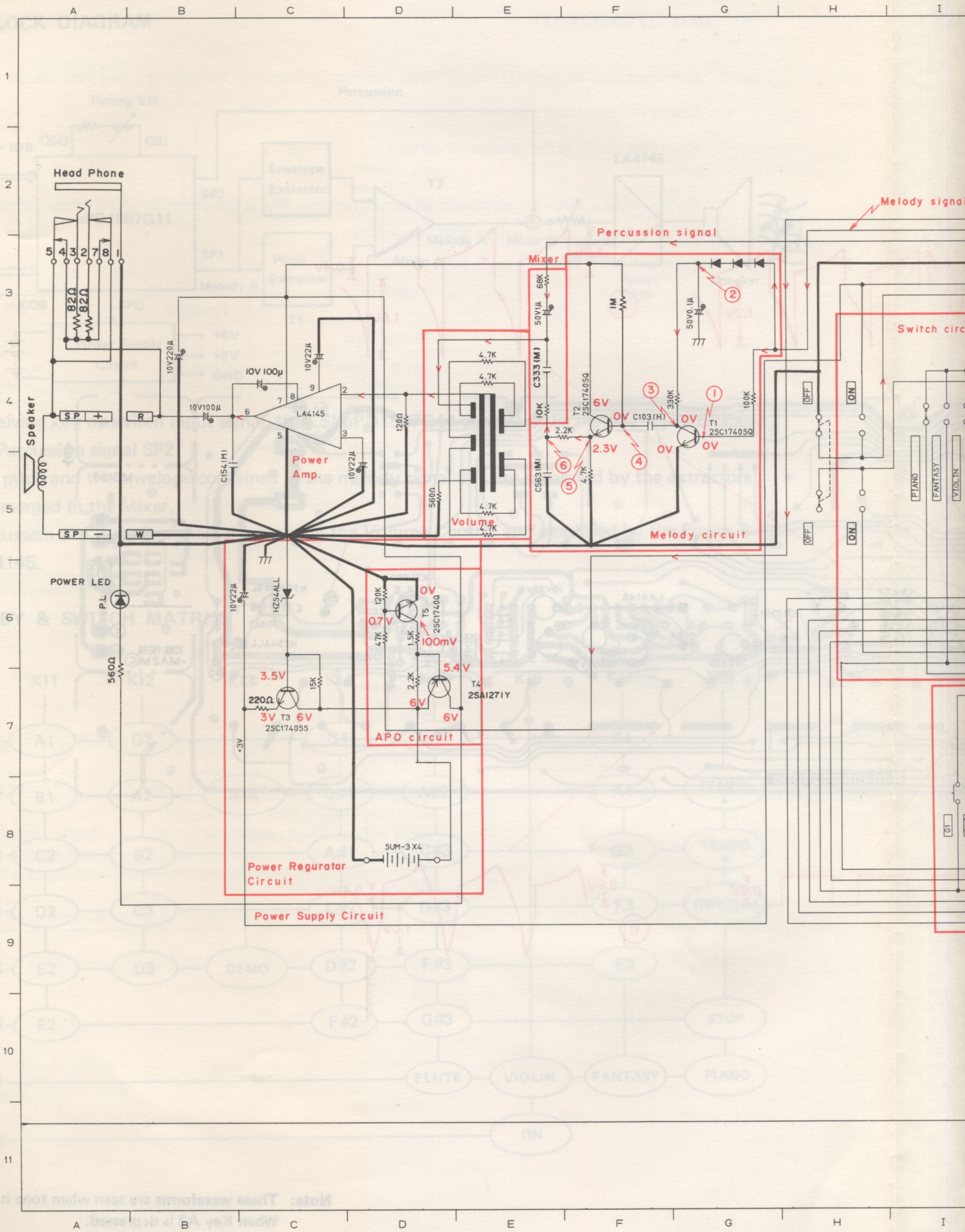


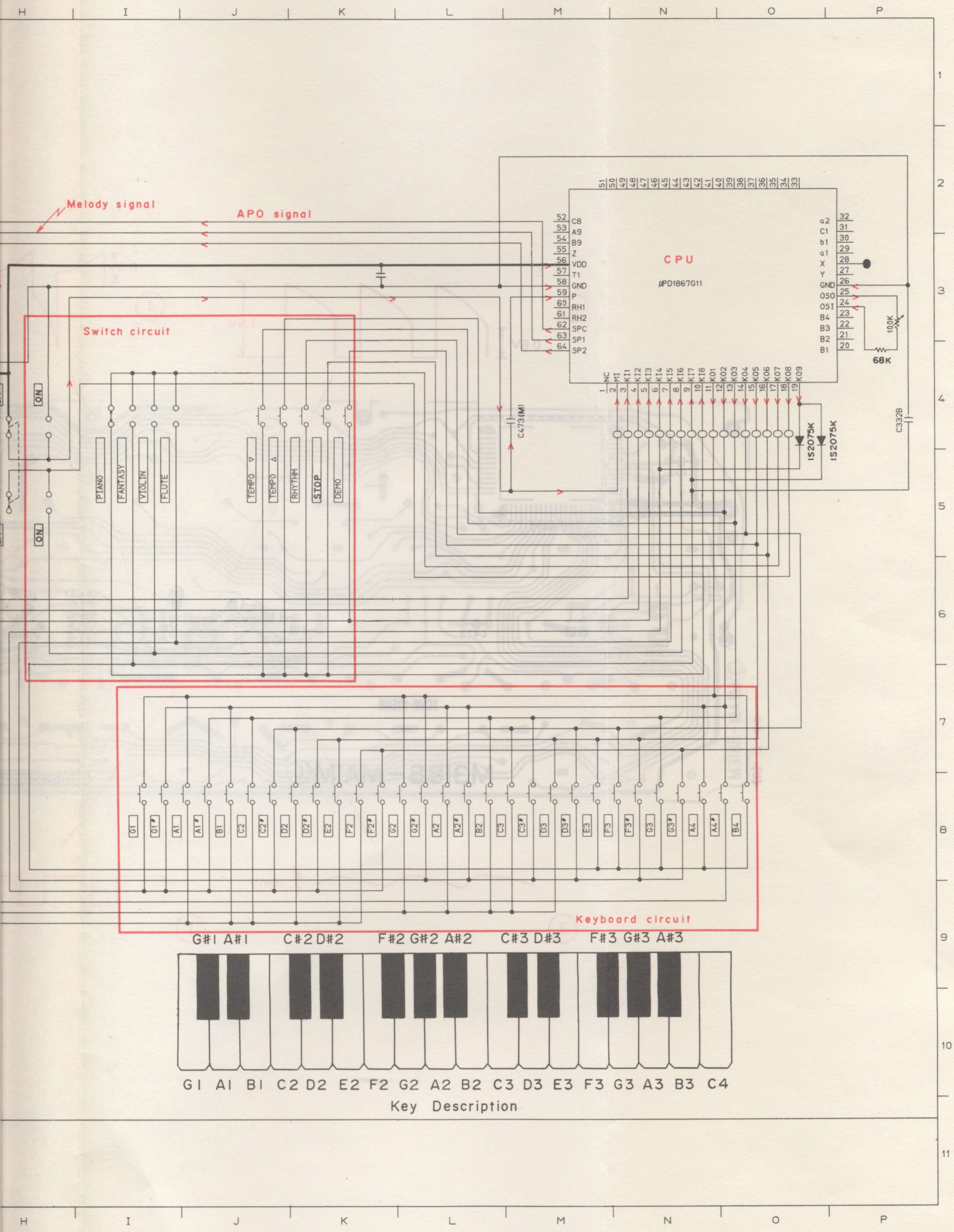
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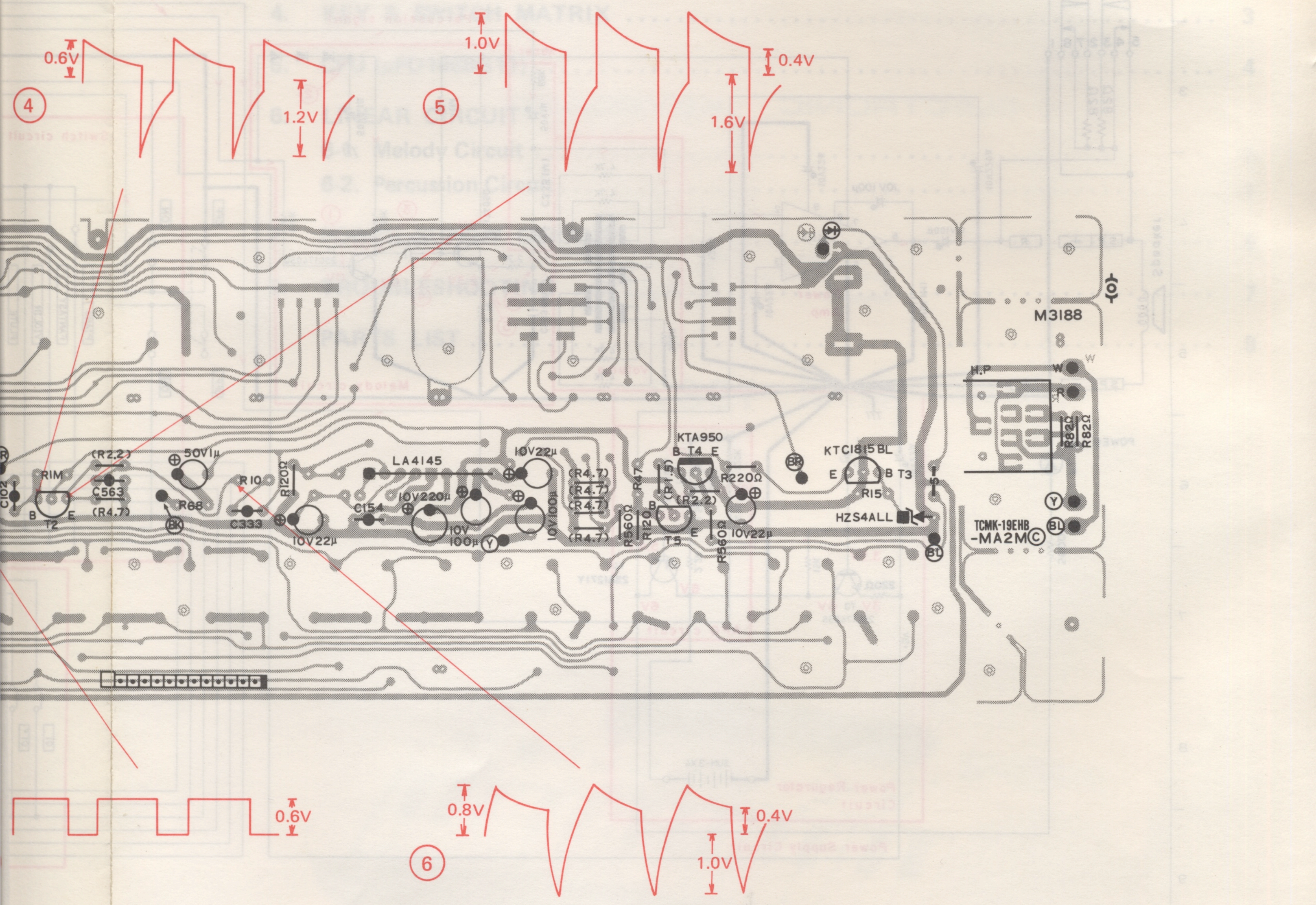
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1. SCHEMATIC DIAGRAM M3188-MA1M, 2M



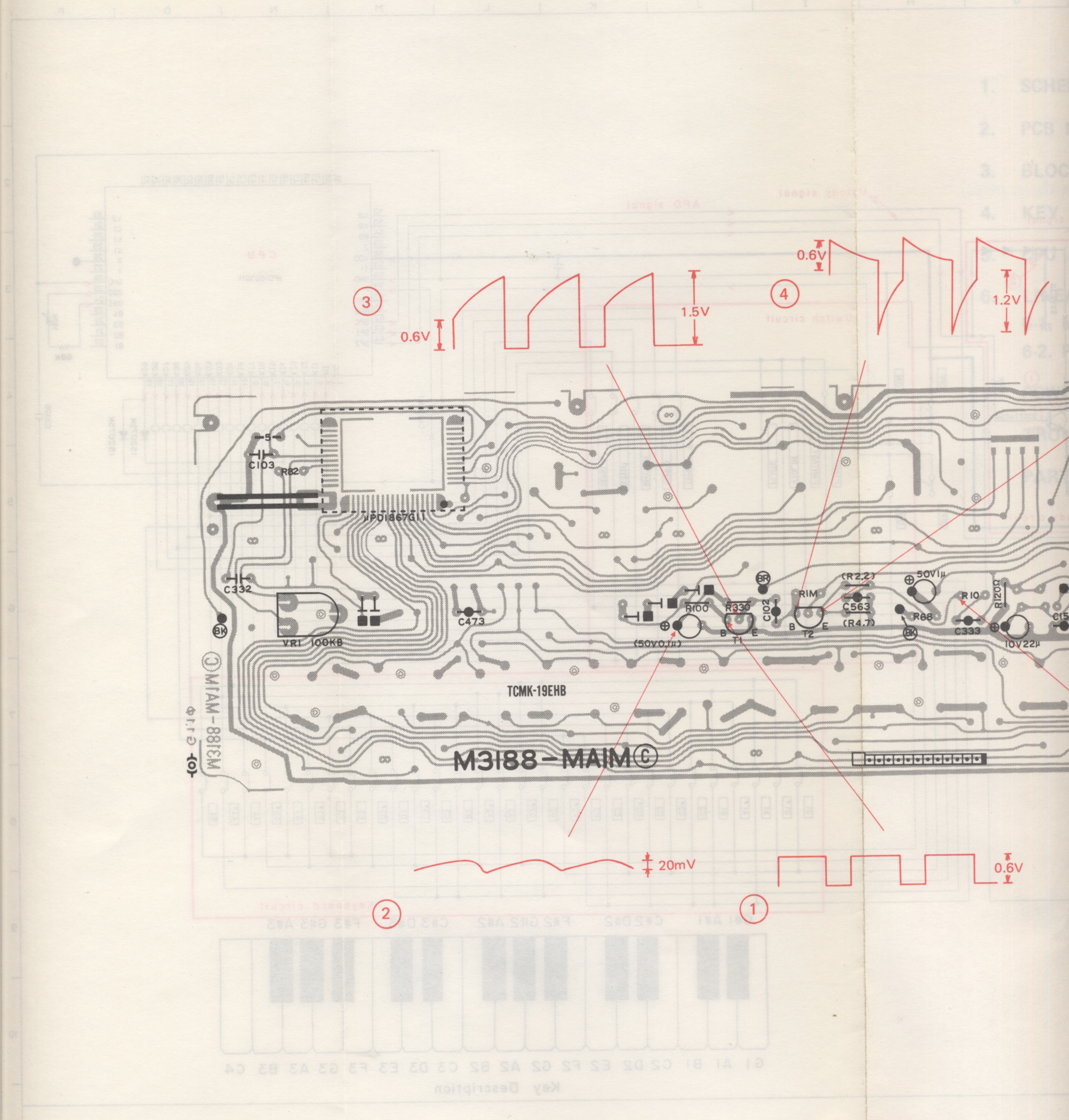


H I J K L M N O P
1 2 3 4 5 6 7 8 9 10 11
Melody signal
APO signal
CPU
μPD1867G11
52 C8
53 A9
54 B9
55 Z
56 VDD
57 T1
58 GND
59 P
60 RH1
61 RH2
62 SPC
63 SP1
64 SP2
a2 32
C1 31
b1 30
a1 29
X 28
Y 27
GND 26
OSO 25
OSI 24
B4 23
B3 22
B2 21
B1 20
100K
68K
C332B
C473(M)
1S2075K
1S2075K
1 NC
2 MI
3 K11
4 K12
5 K13
6 K14
7 K15
8 K16
9 K17
10 K18
11 K01
12 K02
13 K03
14 K04
15 K05
16 K06
17 K07
18 K08
19 K09
Switch circuit
ON
ON
PIANO
FANTASY
VIOLIN
FLUTE
TEMPO ▽
TEMPO △
RHYTHM
STOP
DEMO
G1 G1# A1 A1# B1 C2 C2# D2 D2# E2 F2 F2# G2 G2# A2 A2# B2 C3 C3# D3 D3# E3 F3 F3# G3 G3# A4 A4# B4
Keyboard circuit
G#1 A#1 C#2 D#2 F#2 G#2 A#2 C#3 D#3 F#3 G#3 A#3
G1 A1 B1 C2 D2 E2 F2 G2 A2 B2 C3 D3 E3 F3 G3 A3 B3 C4
Key Description

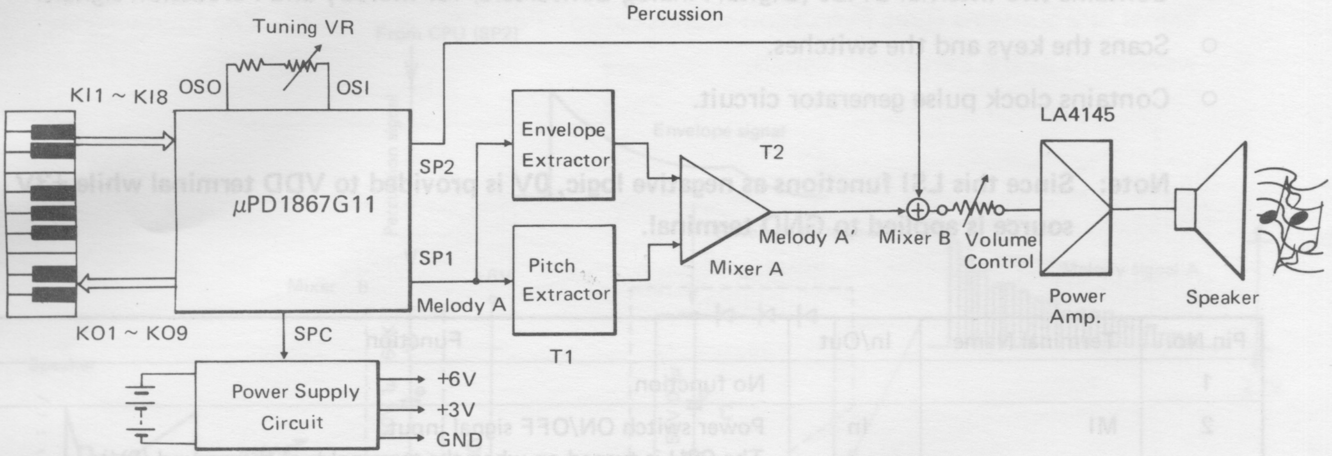


Note: These waveforms are seen when tone is set to FLUTE
When Key A2 is depressed.

PCB LAYOUT & MAJOR WAVEFORMS



3. BLOCK DIAGRAM

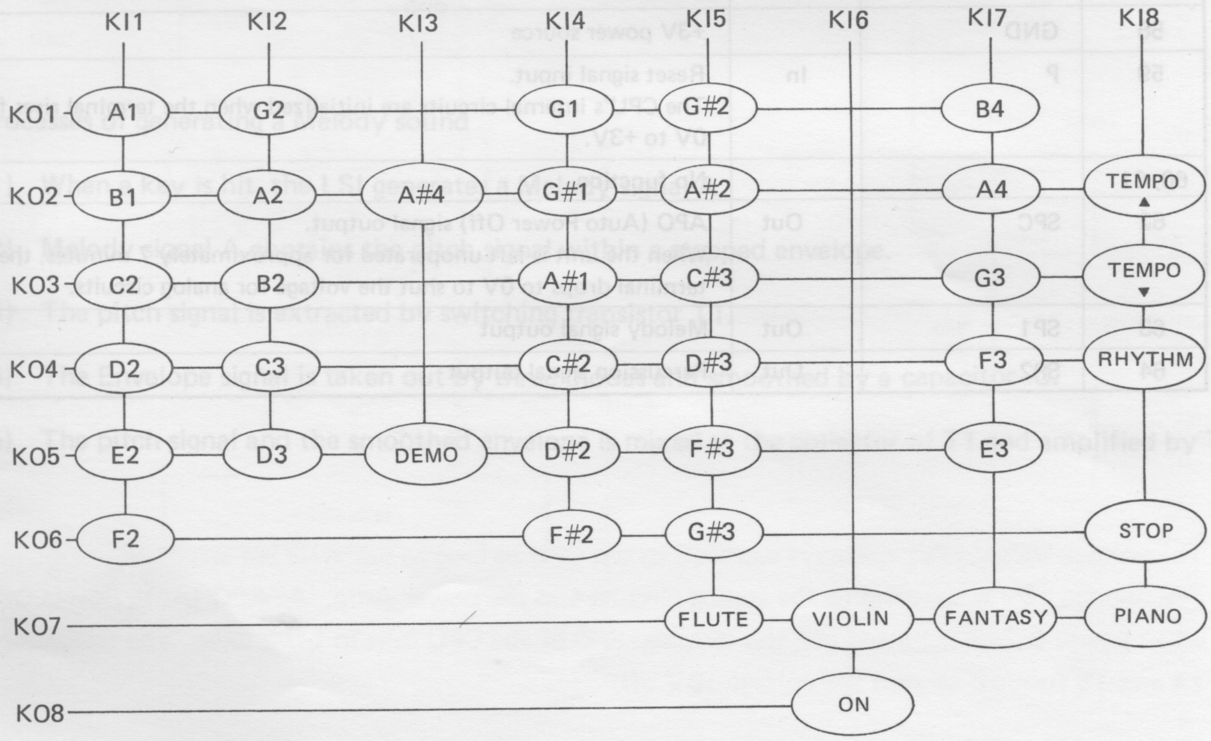


Receiving key or switch input signal, the LSI μPD1867G11 generates the melody signal SP1 and the Percussion signal SP2.

The pitch and the envelope contained in the melody signal SP1 are separated by the extractors and merged in the Mixer.

Percussion and melody signals are mixed in the Volume Control and amplified by the Power Amp. LA4145.

4. KEY & SWITCH MATRIX



5. CPU (μPD1868G11)

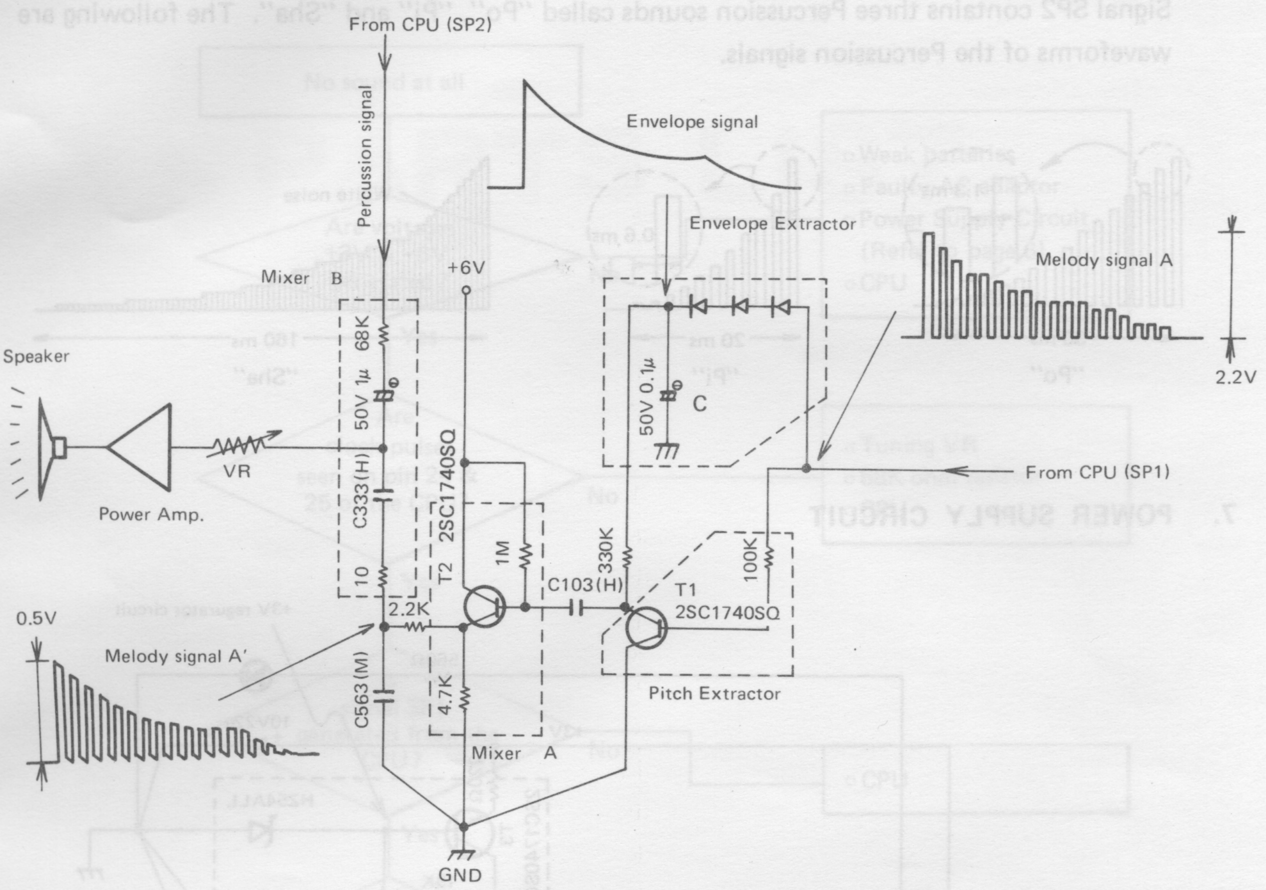
- Contains two internal DACs (Digital Analog Converters) for Melody and Percussion signals.
- Scans the keys and the switches.
- Contains clock pulse generator circuit.

Note: Since this LSI functions as negative logic, 0V is provided to VDD terminal while +3V source is applied to GND terminal.

Pin No.	Terminal Name	In/Out	Function
1			No function
2	MI	In	Power switch ON/OFF signal input. The CPU is turned on when the terminal is at the ground (0V).
3 ~ 10	KI1 ~ KI8	In	Key input signals input
11 ~ 19	KO1 ~ KO9	Out	Key common signals output
20 ~ 23			No function
24, 25	OSI, OSO	In/Out	Clock pulse signal input/output. By connecting external resistors between these terminals, the frequency of the clock pulse is determined.
26	GND		+3V power source
27 ~ 55			No function
56	VDD		Ground (0V) source
57			No function
58	GND		+3V power source
59	P	In	Reset signal input. The CPU's internal circuits are initialized when the terminal rises from 0V to +3V.
60, 61			No function
62	SPC	Out	APO (Auto Power Off) signal output. When the unit is left unoperated for approximately 7 minutes, the terminal drops to 0V to shut the voltage for analog circuits.
63	SP1	Out	Melody signal output
64	SP2	Out	Percussion signal output

6. LINEAR CIRCUIT

6-1. Melody Circuit



Processes of generating a Melody sound

(1) When a key is hit, the LSI generates a Melody signal A.

(2) Melody signal A contains the pitch signal within a stepped envelope.

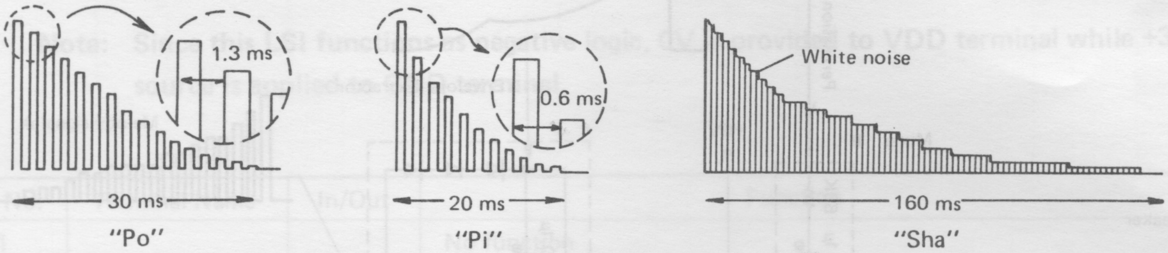
(3) The pitch signal is extracted by switching transistor T1.

(4) The Envelope signal is taken out by three diodes and smoothed by a capacitor C.

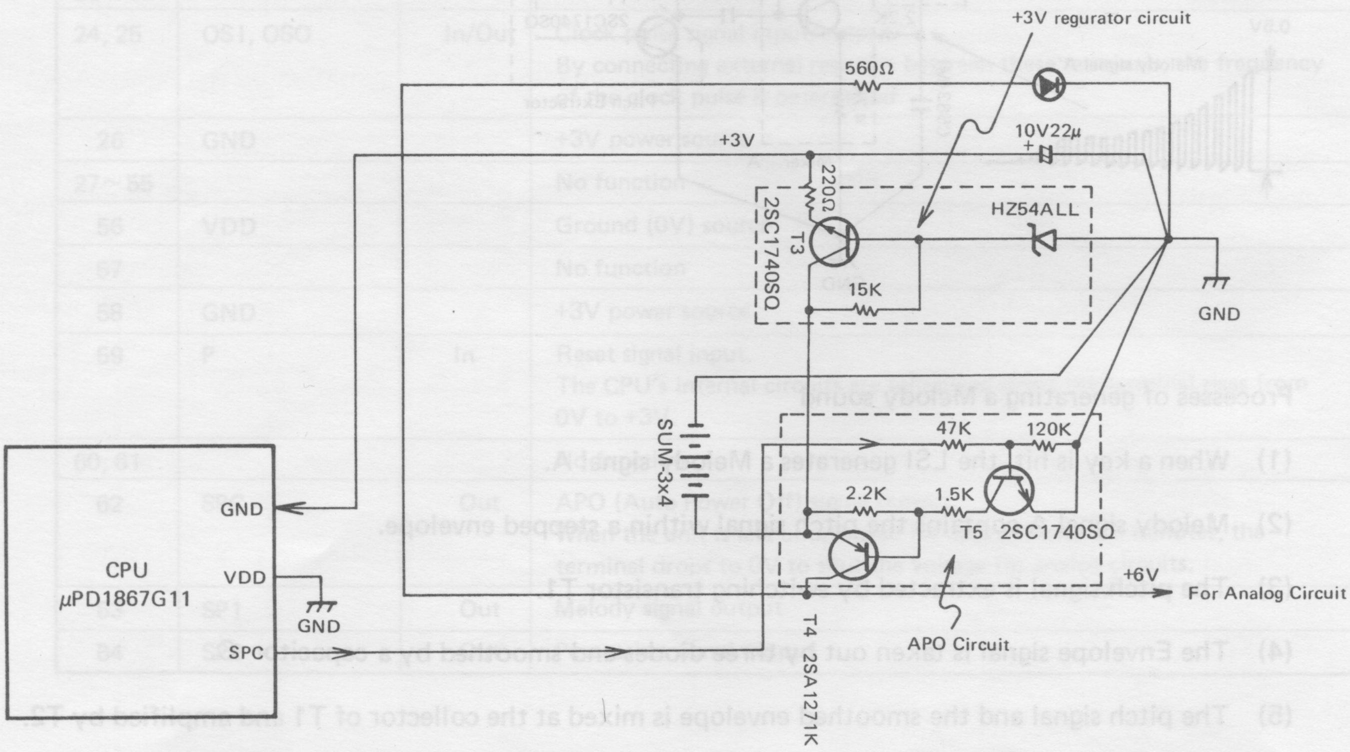
(5) The pitch signal and the smoothed envelope is mixed at the collector of T1 and amplified by T2.

6-2. Percussion Circuit

In accordance with the selected rhythm, the LSI generates the Percussion signal SP2. Signal SP2 contains three Percussion sounds called "Po" "Pi" and "Sha". The following are waveforms of the Percussion signals.

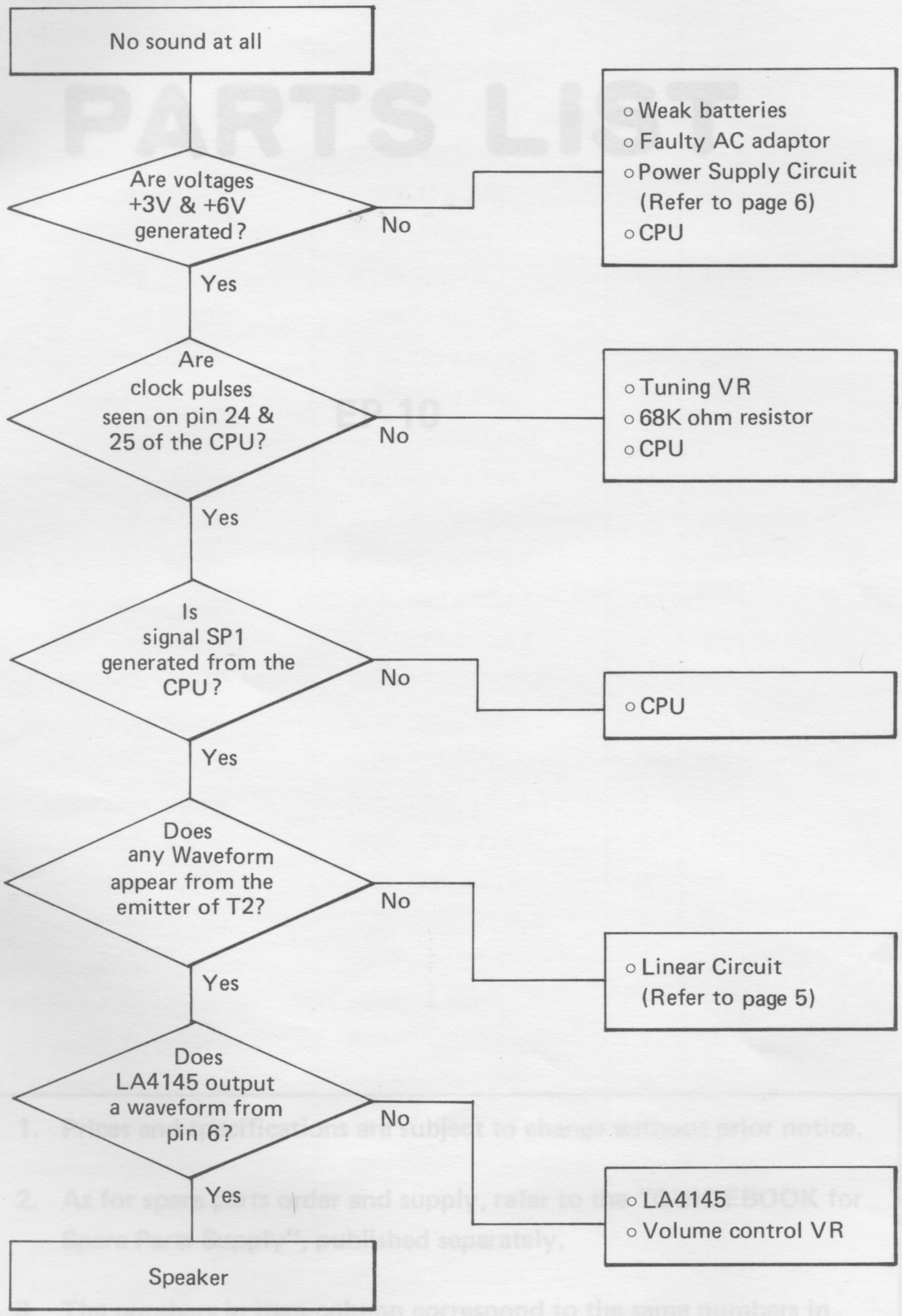


7. POWER SUPPLY CIRCUIT



The voltage VDD (+3V) is always supplied to the CPU as long as batteries are set.
The voltage +6V is supplied to the analog circuits and the power Amp. At APO (Auto Power Off) or when power switch is turned off, the terminal SPC of the CPU falls to LOW level. The transistors T4 and T5 turn off to shut the voltage +6V off.

8. TROUBLESHOOTING



PARTS LIST

EP-10

Notes:

1. Prices and specifications are subject to change without prior notice.
2. As for spare parts order and supply, refer to the "GUIDEBOOK for Spare Parts Supply", published separately.
3. The numbers in item column correspond to the same numbers in drawing.

Item	Code No.	Part Name	Specification	Q'ty	*	Unit Price N.R. Yen (¥) (FOB: JAPAN)	Rank
	1) M3188-MA1M PCB ASS'Y						
	2001 1424	LSI (CPU)	μPD1867G11	1			B
	2120 8540	Monolithic IC (Power amp.)	LA4145	1			B
	2220 1387	Transistor	2SC1740SQ-TP-T	3	10		B
☆	2250 0098	Transistor	2SA1271Y-AT-T	1	10		B
	2252 0154	Transistor	2SC1740SS-TP-T	1	10		B
	2760 2231	Semi-fixed resistor	V8K4-11B100K	1	10		C
	2301 0241	Diode	1SS254T-77-T	5	20		X
☆	2360 0490	Zener diode	HZS4ALLTD-T	1	20		C
14☆	2370 0112	LED	LN28RPX-(TT8)	1	20		C
	2617 0036	Carbon film resistor	R-20-220-J-T-24-T	1	20		X
	2617 0044	Carbon film resistor	R-20-560-J-T24-T	2	20		X
	2617 0061	Carbon film resistor	R-20-2.2K-J-T24-T	2	20		X
	2617 0087	Carbon film resistor	R-20-4.7K-J-T24-T	5	20		X
	2617 0095	Carbon film resistor	R-20-10K-J-T24-T	1	20		X
	2617 0117	Carbon film resistor	R-20-47K-J-T24-T	1	20		X
	2617 0125	Carbon film resistor	R-20-68K-J-T24-T	1	20		X
	2617 0133	Carbon film resistor	R-20-82K-J-T24-T	1	20		X
	2617 0141	Carbon film resistor	R-20-100K-J-T24-T	1	20		X
	2617 0176	Carbon film resistor	R-20-1M-J-T24-T	1	20		X
☆	2617 0211	Carbon film resistor	R-20-120-J-T24-T	1	20		X
	2617 0262	Carbon film resistor	R-20-120K-J-T24-T	1	20		X
	2617 0289	Carbon film resistor	R-20-15K-J-T24-T	1	20		X
	2617 0360	Carbon film resistor	R-20-1.5K-J-T24-T	1	20		X
	2617 0491	Carbon film resistor	R-20-330K-J-T24-T	1	20		X
	2805 3134	Electrolytic capacitor	10RE2-22-T2-T	3	20		X
	2807 0551	Electrolytic capacitor	50RER1-T2-T	1	10		X
	2807 1023	Electrolytic capacitor	50RE2-1-T2-T	1	10		X
	2807 1112	Electrolytic capacitor	10RE2-100-T2-T	2	20		X
	2807 1121	Electrolytic capacitor	10RE2-220-T2-T	1	20		X
	2818 0462	Ceramic capacitor	RT-HE70TKYB332K-T	1	10		X
	2818 2082	Ceramic capacitor	RT-HE70TKYF103Z-T	1	10		X
	2830 6211	Mylar capacitor	AMZV-154K50-T	1	10		X
	2830 6237	Mylar capacitor	AMZV-102K50-T	1	10		X
	2830 6253	Mylar capacitor	AMZV-563K50-T	1	10		X
	2830 6398	Mylar capacitor	AMZV-333K50-T	1	10		X
	2830 6436	Mylar capacitor	AMZV-473K50-T	1	10		X
☆	4307 7561	Blank PCB M3188-MA1M	M11296A-1	1			X

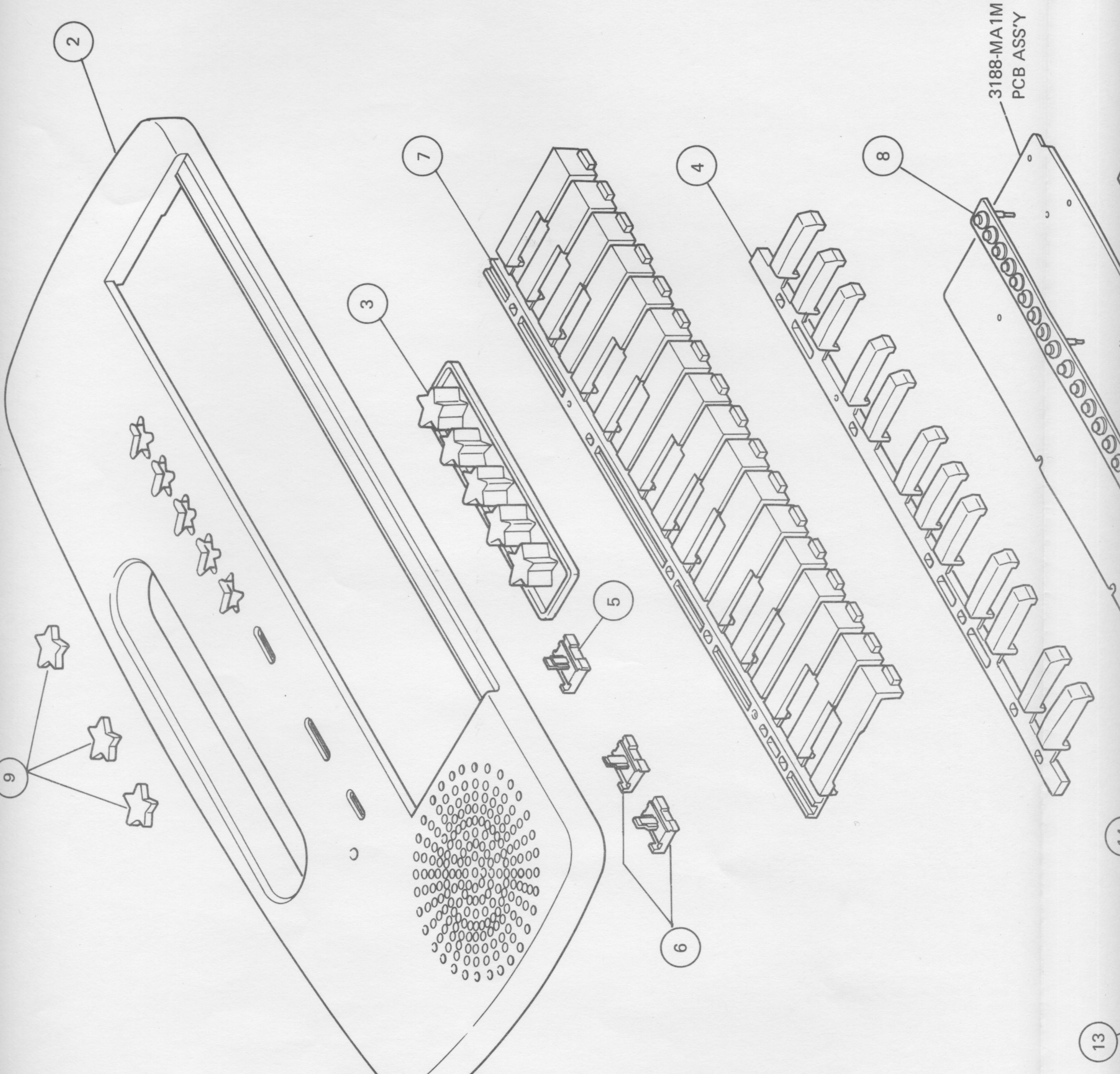
Note: ☆ — New parts
Q'ty — Quantity used per unit
* — Minimum order and supply quantity

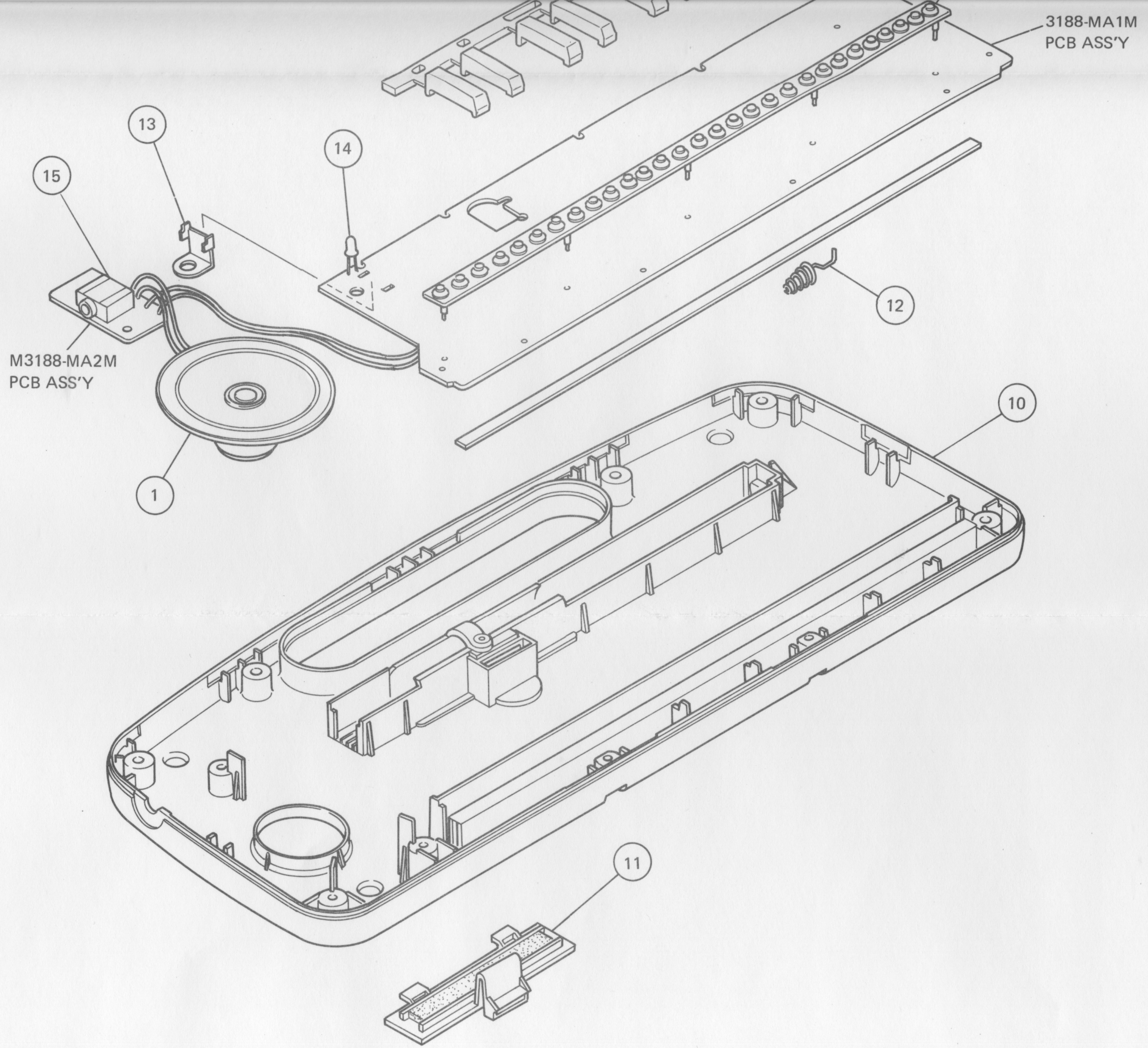
Rank A: Essential
B: Stock recommended
C: Others
X: No stock recommended

Item	Code No.	Part Name	Specification	Q'ty	*	Unit Price N.R. Yen (¥) (FOB: JAPAN)	Rank
	2) M3188-MA2M PCB ASS'Y						
15	3501 0840	Jack	YKB21-5152	1			C
	2617 0290	Carbon film resistor	R-20-82-J-T24-T	2	20		X
☆	4307 7551	Blank PCB M3188-MA2M	M11296A-2	1			X
	3) UPPER CASE ASS'Y						
1☆	3831 0042	Speaker	KC06573	1			C
2☆	6909 7331	188 Upper case sub ass'y	M21742A*1	1			C
3☆	6909 7340	Rubber button 188	M32683-1	1	5		C
4☆	6909 7360	Black key set M115	M2894-5	1	5		C
5☆	6909 7370	SL contact 9S	CSB-09S	1	20		C
6☆	6909 7380	SL contact 9D	CSB-09D	2	20		C
7☆	6911 3460	White key set M115	M2893-1	1			C
8☆	6911 2220	Contact rubber M115	M31397-1	1			C
9☆	6909 7350	Contact button 188	M32682-1	3	20		C
	4) LOWER CASE ASS'Y						
10☆	6909 7300	188 Lower case sub ass'y	M21744*1	1			C
11☆	6912 5973	Battery cover sub ass'y	M31417C*19	1	10		C
12☆	6909 7470	B spring 215	M43305-1	1	20		C
13☆	6911 2341	Battery spring 115	M41804A-1	1	20		C

Note: ☆ — New parts
Q'ty — Quantity used per unit
* — Minimum order and supply quantity

Rank A: Essential
B: Stock recommended
C: Others
X: No stock recommended


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13
3188-MA1M
PCB ASS'Y


3188-MA1M
PCB ASS'Y
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M3188-MA2M
PCB ASS'Y
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